

**Notice of Allowability**

Application No.

09/930,389

Examiner

Huyen X. Vo

Applicant(s)

GADDE, VENKATA RAMANA RAO

Art Unit

2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 7/28/2005.
2. ☒ The allowed claim(s) is/are 1,2,5-8,11-14,17 and 18.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

W. R. YOUNG  
PRIMARY EXAMINER

## DETAILED ACTION

### EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

*to provide the estimating signal to noise ratio*  
Authorization for this examiner's amendment was given in a telephone interview with applicant's representative, Ms. Diana J. Rea on 9/7/2005. The application has been amended as follows:

#### **Claims 1, 5, 7, 13, and 17 have been amended as follows:**

1. Method for performing speech recognition on an input audio signal having a speech component and a noise component, said method comprising the steps of:
  - (a) obtaining at least one clean speech model;
  - (b) obtaining at least one noise model;
  - (c) estimating a signal-to-noise ratio of the input audio signal;
  - (d) generating a weight in accordance with the signal-to-noise ratio by accessing a signal-to-noise ratio/weight table;
  - (e) applying said weight to said at least one noise model and said at least one clean speech model to derive said at least one noisy speech model; and

(f) applying said at least one noisy speech model to extract a recognized text from the input audio signal.

5. The method of claim 1, wherein said applying step (e) applies said weight in a first multiplication operation to said at least one noise model and in a second multiplication operation to said at least one clean speech model.

7. Apparatus for performing speech recognition on an input audio signal having a speech component and a noise component, said apparatus comprising:

means for obtaining at least one clean speech model;

means for obtaining at least one noise model;

means for estimating a signal-to-noise ratio of the input audio signal;

means for generating a weight in accordance with said signal-to-noise ratio by accessing a signal-to-noise ratio/weight table;

means for applying said weight to said at least one noise model and said at least one clean speech model to derive said at least one noisy speech model; and

means for applying said at least one noisy speech model to extract a recognized text from the input audio signal.

13. A computer-readable medium having stored thereon a plurality of instructions, the plurality of instructions including instructions which, when executed by a processor, cause the processor to perform the steps of a method for performing speech recognition

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on an input audio signal having a speech component and a noise component, said method comprising the steps of:

- (a) obtaining at least one clean speech model;
- (b) obtaining at least one noise model;
- (c) estimating a signal-to-noise ratio of the input audio signal;
- (d) generating a weight in accordance with the signal-to-noise ratio by accessing a signal-to-noise ratio/weight table;
- (e) applying said weight to said at least one noise model and said at least one clean speech model to derive said at least one noisy speech model; and
- (f) applying said at least one noisy speech model to extract a recognized text from the input audio signal.

17. The computer-readable medium of claim 13, wherein said applying step (e) applies said weight in a first multiplication operation to said at least one noise model and in a second multiplication operation to said at least one clean speech model.

***Allowable Subject Matter***

2. Claims 1-2, 5-8, 11-14, and 17-18 are allowed over prior art of record. The following is an examiner's statement of reasons for allowance: Yamaguchi et al. (US 6026359) disclose a model adaptation scheme in the pattern recognition, which is capable of realizing a fast, real time model adaptation and improving the recognition performance. This model adaptation scheme determines a change in a parameter

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expressing a condition of pattern recognition and probabilistic model training between an initial condition at a time of acquiring training data used in obtaining a model parameter of each probabilistic model and a current condition at a time of actual recognition. Then, the probabilistic models are adapted by obtaining a model parameter after a condition change by updating a model parameter before a condition change according to the determined change, when the initial condition and the current condition are mismatching. The adaptation processing uses a Taylor expansion expressing a change in the model parameter in terms of a change in the parameter expressing the condition. Komori et al. (US 5956679) teach a speech processing apparatus that includes a noise model production device for extracting a noise-speech interval from input speech data and producing a noise model by using the data of the extracted interval. The apparatus also includes a composite distribution production device for dividing the distributions of a speech model into a plurality of groups, producing a composite distribution of each group, and determining the positional relationship of each distribution within each group. In addition, the apparatus includes a memory for storing each composite distribution and the positional relationship of each distribution within the group, and a PMC conversion device for PMC-converting each produced composite distribution. Also provided is a noise-adaptive speech model production device for producing a noise-adaptive speech model on the basis of the composite distribution, which is PMC-converted by the PMC conversion device and the positional relationship stored by the memory. Further, the apparatus includes an output device for determining

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and outputting a recognition result and a candidate with their likelihood for the input speech data by using the produced noise-adaptive speech model.

Both Yamaguchi et al. and Komori et al. fail to specifically disclose the steps of generating a weight in accordance with the signal-to-noise ratio by accessing a signal-to-noise ratio/weight table and then applying said weight to said at least one noise model and said at least one clean speech model to derive said at least one noisy speech model. Furthermore, it would have not been obvious to one of ordinary skill in the art at the time of invention to modify Yamaguchi et al. and/or Komori et al. to obtain the claimed invention. Therefore, claims 1-2, 5-8, 11-14, and 17-18 are allowed over prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Huyen X. Vo whose telephone number is 571-272-7631. The examiner can normally be reached on M-F, 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wayne Young can be reached on 571-272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

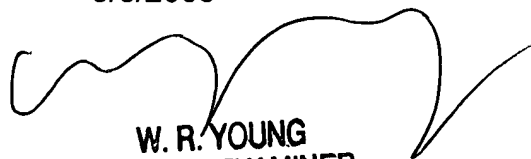
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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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9/8/2005



W. R. YOUNG  
PRIMARY EXAMINER